

**ABSTRACT OF THE DISCLOSURE**

The present invention provides a method of cleaving a recombinantly expressed protein from an intein and ligating the protein to a peptide containing an N-terminal cysteine having an unoxidized sulfhydryl side chain which comprises contacting the protein with the peptide in a reaction solution comprising a conjugated thiophenol, thereby forming a C-terminal thioester of the recombinant protein which spontaneously rearranges intramolecularly to form an amide bond linking the protein to the peptide. The present invention also provides a method of producing a protein-chip composition comprising the steps of: (a) contacting a solid support chip containing an amine group with a peptide containing an N-terminal cysteine having an unoxidized sulfhydryl side chain thereby covalently linking the peptide to the solid support, forming a peptide-chip; and (b) contacting a recombinant protein having an intein domain with the peptide-chip of step (a) with a reaction solution containing a conjugated thiophenol, thereby forming a C-terminal thioester of the recombinant protein which spontaneously rearranges intramolecularly to form an amide bond covalently linking the protein to the peptide-chip, thereby producing a protein-chip composition.